In the Drawings:

Please substitute the attached Replacement Drawing Figures 3 and 4 for the originally filed Figures 3 and 4 in this case.

# REMARKS

A legend - - PRIOR ART - - has been required to be placed on Figures 3 and 4. Replacement drawings are submitted herewith.

Claims 4-6, 9, 10, 15, 19, and 23-29 are objected to as depending from a multiple dependent claim. Applicants question whether the correct version of the application was examined, as claim 15 depends from claim 13 which depends from independent claim 11, claim 19 likewise is dependent on independent claim 11, and claims 23-29 depend from independent claim 20, all without any multiple dependencies. Did the Examiner examine the English translation of the PCT application as originally filed rather than the version which was actually filed with the Patent Office? Nonetheless, the claims have been amended to remove any existing multiple dependencies.

All typographical errors located have been corrected.

The Examiner has indicated the claims 13-14, 16-18, and 31-37 contain allowable subject matter, and would be allowable if rewritten to include the limitations of the base claim and any intervening claims.

Claims 1, 3, 11, 12, 20-22, and 30 stand rejected as unpatentable over Kanzaki in view of Games. Independent claims 1, 11, 20 and 30 are amended to clarify how the step of generating the first transmission symbol and the step of generating the second transmission symbol work. The limitations of claims 5 and 6 have been incorporated into claim 1. This is supported by page 12, third and fourth paragraph of the Specification regarding the term "signal

constellation diagram" in the fourth paragraph of amended claim 1. Reference is also made to page 10, first paragraph and the paragraph bridging pages 14 and 15 through the first paragraph of page 17. Amended claim 1 now indicates that the first transmission symbol as well as the second transmission symbol have a certain state in the complex constellation plane. Both transmission symbols are derived from the same information symbol as set forth in the second and third paragraphs of claim 1. The first transmission symbol has one state of a plurality of predefined phase states in the complex constellation plane, and the second transmission symbol has a different phase state than the first state. This wording corresponds to that shown in Fig. 2. The other alternative recited in claim 1 refers to Fig. 1, in which the first and second states have the same phase state but have different amplitude states.

The same limitations introduced into amended claim 1 have been introduced into all other independent claims so that the following remarks on regarding novelty and obviousness relate to all independent claims.

Kanzaki US Patent No. 5,652,764 discloses to perform spreading a transmission bit by two different orthogonal spreading codes. Thus, the transmission data consists of several bits as shown in Fig. 4(a). By spreading such a bit using two different orthogonal codes as shown in Figures 4(b) and 4(c), two different transmission codes are generated for a single bit of transmission data. These two different transmission codes are shown in Fig. 4(d) and Fig. 4(e). Stated in detail, transmission data bit "1" corresponds to bits 1 to 8 in Fig. 4(d) and also corresponds to bits 1 to 8 in Fig. 4(e).

Finally, a high-frequency carrier generated by oscillator 40 is subjected to a binary phase shift keying operation by modulators 51 and 52 as outlined in column 4, lines 13 and 15. As it

is known in the art, a binary phase shift keying modulator has a constellation plane, which corresponds to the constellation plane shown in Fig. 3 of this application, when the points on the imaginary axis (10 and 01 ) are disregarded. Thus, the point on the positive part of the real axis would correspond to a binary "1" in the BPSK constellation plane, while the point on the negative real axis would correspond to the binary "0" in a BPSK constellation plane. Nevertheless, the Examiner compares generation of the first transmission symbol and the second transmission symbol to spreading the same information bit via two different spreading sequences. However, Kanzaki does not disclose that, when generating the first transmission symbol and the second transmission symbol, a signal constellation diagram having a predefined number of different states in a complex constellation plane is used. Instead, Kanzaki suggests using different spreading sequences, while the invented method is defined by using a certain novel constellation diagram.

Furthermore, the two transmission codes for a single information bit shown in Fig. 4(d) and Fig. 4(e) in Kanzaki are two different bit sequences which the Examiner compares to the first transmission symbol and the second transmission symbol. Contrary thereto, the first transmission symbol as defined by amended claim 1 has a phase state of a plurality of predefined phase states, while the second transmission symbol has a different phase state than the first state. The second transmission symbol has the same phase state as the first phase state but has different amplitude than the first state.

Thus, amended claim 1 is not obvious from Kanzaki because of the two different transmission symbols which differ in their phase states or amplitude states in the complex constellation plane defined by the signal constellation diagram. Kanzaki does not have any signal constellation diagram for generating transmission codes but has two different spreading

sequences. Please note that the constellation diagram used by the PPSK modulator 51 and 52 is a straight-forward constellation diagram as outlined above. This means that, for the same information symbol only a single transmission symbol is generated. This means that, when the transmission code in Fig. 4(d) of Fig. 4(e) has a binary "0", only a single transmission symbol is generated, while, in accordance with the present invention, two different transmission symbols are generated based on the same information symbol.

The Examiner acknowledges that the time diversity feature as outlined in the penultimate and ultimate paragraphs of claim 1 is not shown in Kanzaki. When Kanzaki is combined with Games US Patent No. 3,755,628, one will not arrive at the invented method, since Games is also silent on the inventive enlarged signal constellation diagram used for generating the first and second transmission symbols. Instead, as outlined in column 3, lines 66 to 68 of Games, a data word to be transmitted via the time-diversity channels is only triplicated. Thus, when Games is compared to claim 1, the first transmission signal and second transmission symbol are generated, which are identical to each other. Furthermore, Games does not disclose anything regarding the inventive signal constellation diagram as defined in the fourth and the fifth paragraphs of amended claim 1.

Claims 2, 3, 7 and 8 stand rejected as unpatentable over Kanzaki in view of Games, and further in view of Herzberg US Patent No. 5,881,108. Herzberg discloses an adaptive pre-equalizer for use in data communications equipments. In the Tomlinson precoder shown in Fig. 2, a signal developed by filter 615 is subtracted from a data signal. The output signal of the adder performing the subtraction is input into element 610 for mapping the output signal to a position in a signal point constellation. This mapping is performed using modulo 2L arithmetic, where L is the size of a signal point constellation (column 3, lines 15 to 20 of Herzberg).

It must be noted that the Examiner is incorrect when stating that the preceding signal is subtracted from a current signal. Instead, filter 615 is not a delay stage, but is a filter to be adapted to its optimum state by a start-up or training phase. Particularly, filter 615 is in an FIR filter as outlined in column 2, line 37 having an impulse response represented by a filter coefficient vector. Particular reference is made to column 2, line 57. Here, it is outlined that the feedback section adds an error to a next received symbol, which error is compensated for using the non-linear precoding which is performed in the far-entrance filter to minimize error propagation. Thus, Herzberg has nothing to do with the differential encoding as defined in amended claim 2. (See Fig. 2 of Herzberg)

Finally, please note that Herzberg also does not disclose anything regarding the enlarged signal constellation diagram as set forth in amended claim 2. Since none of the cited references discloses anything regarding the enlarged signal constellation diagram, amended claim 2 and the claims dependent thereon are neither anticipated nor rendered obvious by the prior art references.

Since independent claims 11, 20, 30 have been amended to include the features of the fourth and the fifth paragraphs of amended claim 1, these claims are also neither anticipated nor rendered obvious.

New independent claim 38 has been added, which is based on pending claims 30 and 31, which the Examiner has already found as allowable subject matter, and thus should be readily allowable.

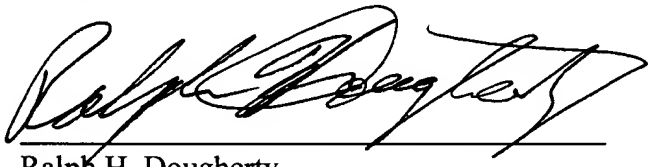
Clearly, therefore, claims 1 through 38, and the claims dependent therefrom, are not obvious from the references within the meaning of 35 USC 103.

The remaining references which were cited but not applied have been thoroughly reviewed, but clearly are no more pertinent to the claims than the references cited in the rejections.

Since the amendment to the claims adds one more independent claim than previously paid for, the additional claim fee is submitted herewith.

In view of the foregoing amendment and these remarks, this application is now believed to be in condition for allowance and such favorable action is respectfully requested on behalf of Applicants.

Respectfully submitted,



Ralph H. Dougherty
Attorney for Applicant
Registration No. 25,851
DOUGHERTY CLEMENTS & HOFER
Suite 300
1901 Roxborough Road
Charlotte, North Carolina 28211
Telephone: 704/366-6643

Attorney's Docket 3104